| P2SC-ROB-WR-063-20110530 Weekly report #063	**P2SC Weekly report**	
Period covered: Date: Written by: Released by:	Mon May 30 to Sun Jun 5 2011 Wed Jun 8 2011 Anik De Groof Carlos Cabanas	Royal Observatory of Belgium PROBA2 Science Center
To:	LYRA PI, marie.dominique@sidc.be SWAP PI, david@sidc.be	http://proba2.sidc.be ++ 32 (0) 2 373 0 559
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1. Science

Solar & Space weather events
The SWAP images of May 30 and June 4 are shown below, with annotated active regions:
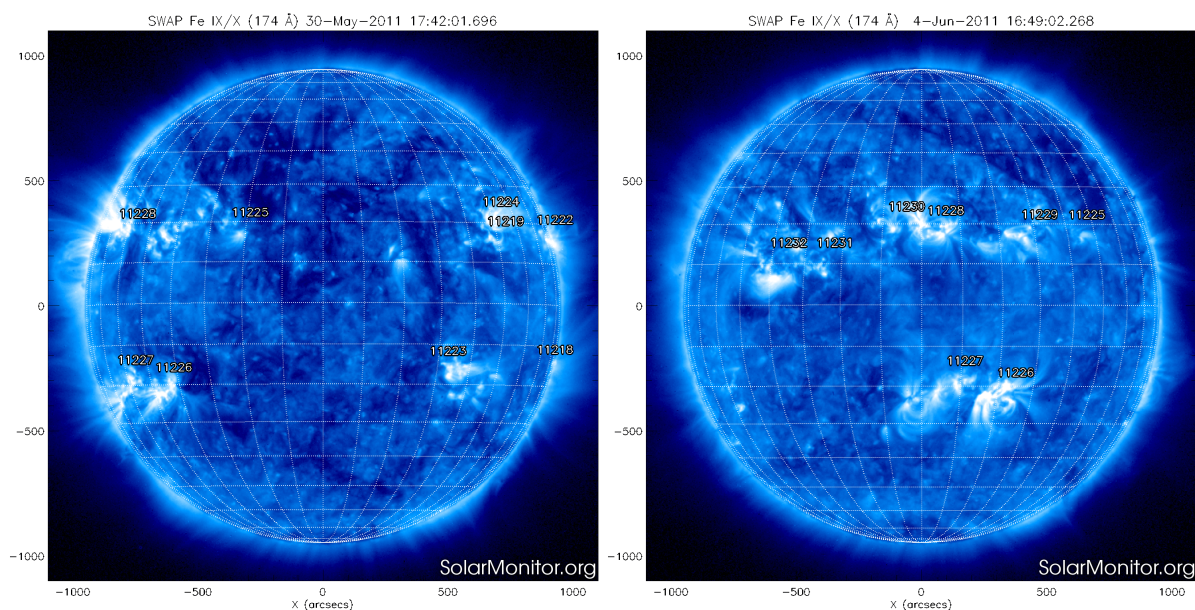
Although 13 ARs crossed the solar disk over the week, the solar activity only reached moderate levels. Several C-class flares were observed from Monday to Friday but nothing really spectacular.

On June 1st however, a **solar eclipse** was seen from high latitudes on Earth. PROBA2 crossed (close to) the lunar shadow path three times. Twice the solar disk got occulted by the lunar disk. During the first 'transit', the shadow of the moon was visible in the North West corner of the SWAP FOV, off-limb.

PROBA2/SWAP 174   2011-06-01T20:51:18.362
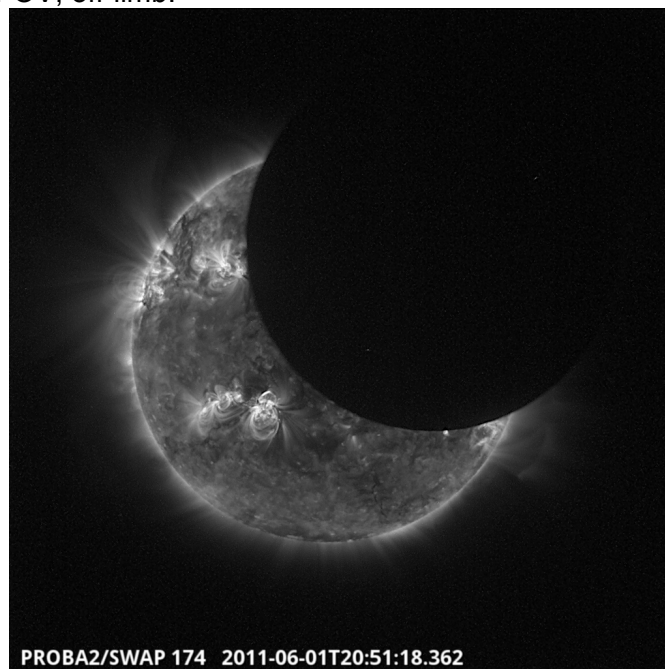
(movie: http://proba2.sidc.be/swap/data/mpg/movies/campaign_movies/
20110601_SWAP_EclipseMovie_complete.mp4)

Week overview of LYRA Al/Zr signals and SWAP average intensity (SWAVINT in purple):
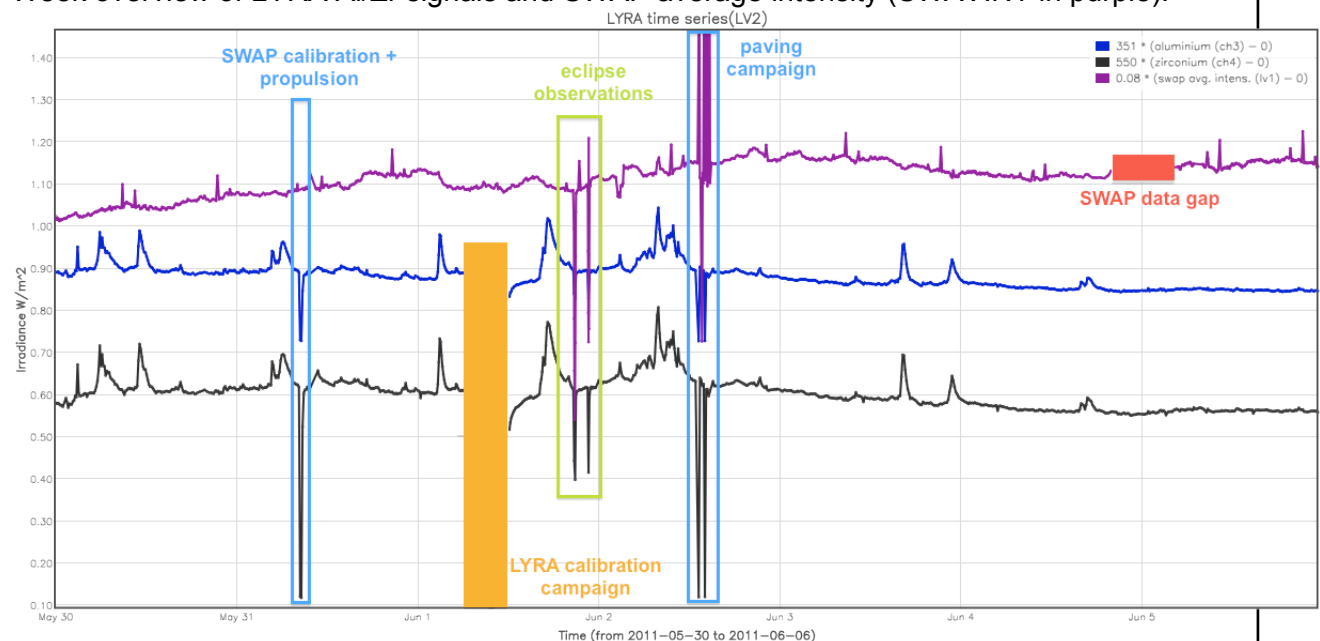
The calibration campaigns are annotated in blue and orange, a SWAP data gap in red. The eclipse observations are shown in green. All those campaigns are described below.
The peaks in LYRA signals are due to flares, the little, periodical peaks in SWAVINT are due to SAA.

Scientific campaigns

LYRA flare hunting campaign:
- Date: May 29-30 2011
- Description: C8 flare was observed with 2 units simultaneously: unit 2 and unit 3
- Results: see description last week's report

Partial solar eclipse:
- Date: June 1st 2011
- Description: The Sun as seen from PROBA2 got occulted twice by the lunar disk: once from 20:41 to 20:57 and once from 22:33 to 22:46.
  - SWAP observed the two transits with increased cadence of 30s. During the first transits the images were taken non-compressed.
  - LYRA observed the first transit with 2 units simultaneously: unit 2 and unit 3. The second transit was planned to be observed by unit 2 and unit 1 but the unit 1 acquisition failed (see Sect. 2)
- Results:
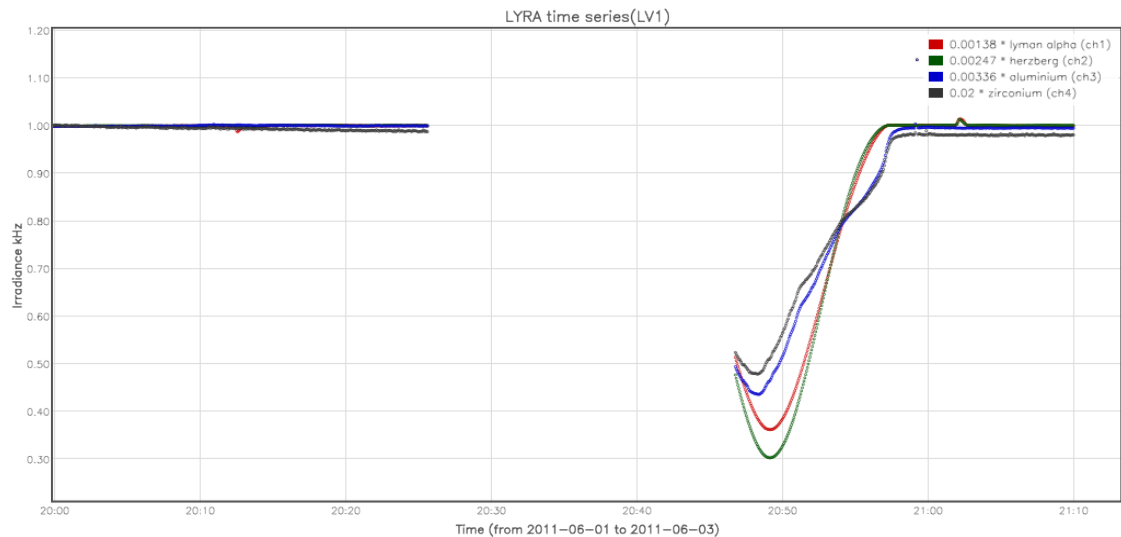 - SWAP observations resulted in a very impressive movie showing the two transits in full glory.
  The movie is available from :
  http://proba2.sidc.be/swap/data/mpg/movies/campaign_movies/
  20110601_SWAP_EclipseMovie_complete.mp4
  - LYRA observations of unit 2 show the 2 transits, with a lot of little variations during the occultation due to separate active regions being occulted or revealed:
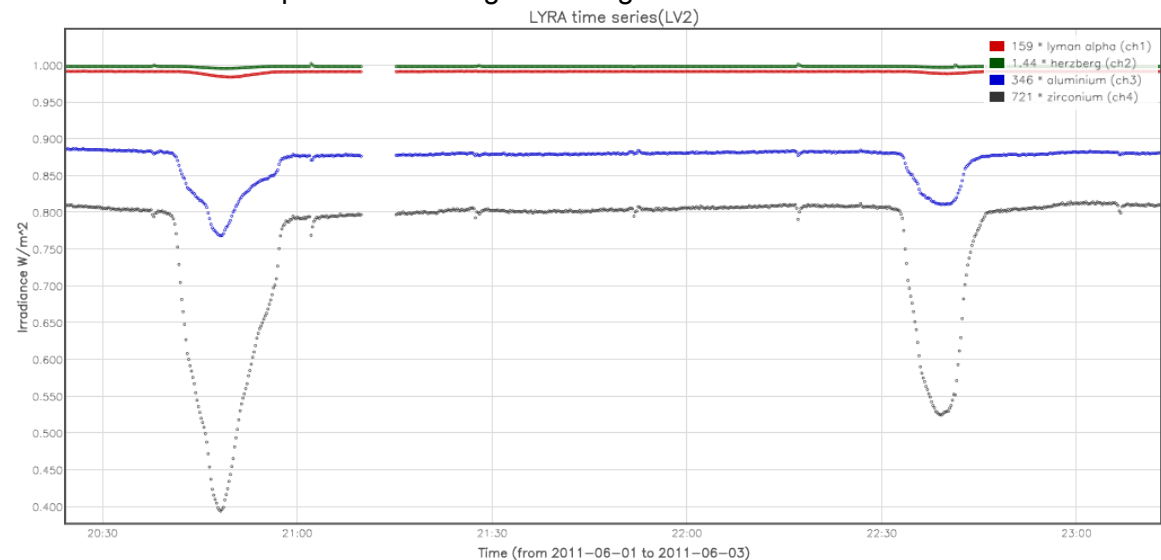

  - LYRA observations of unit 3 are not yet complete. The data was delivered but for some reason, not all data points ended up in the scientific data files. Analysis is ongoing:

LYRA time series(LV1)

Legend: 0.00138 * lyman alpha (ch1), 0.00247 * herzberg (ch2), 0.00336 * aluminium (ch3), 0.02 * zirconium (ch4)

Time (from 2011−06−01 to 2011−06−03)

SWAP mosaic campaign
- Date: June 2 2011
- Description: as context for the eclipse observations the day before, SWAP took a mosaic image by offpointing to the West and East while taking images at 30s cadence. All images got stacked up into the following mosaic.
- Results:
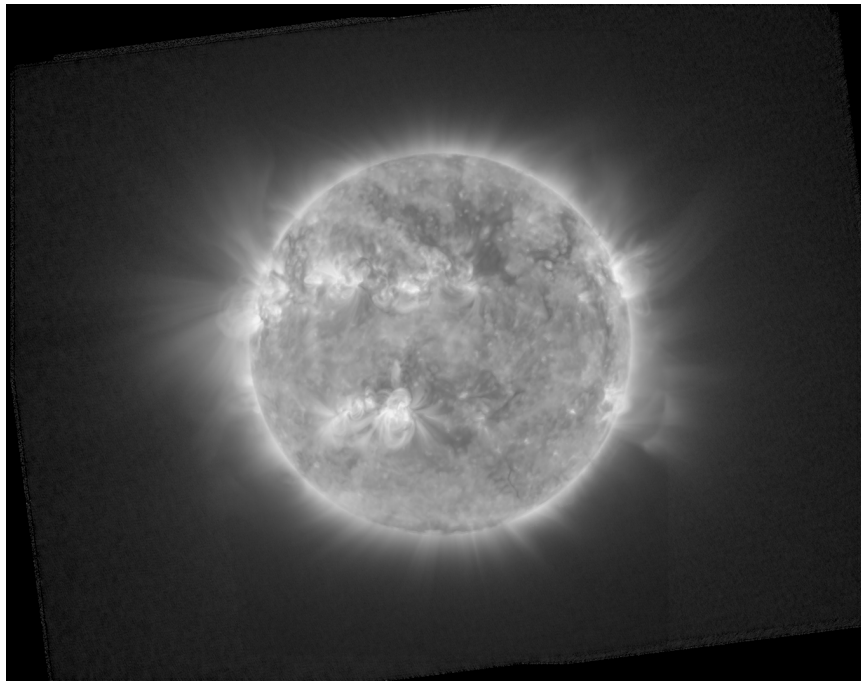
Outreach, papers, presentations, etc.

- David Berghmans presented "A comparison of quasi-periodic pulsations in different wavebands" at the SOTERIA meeting in Leuven. In this talk LYRA signals were compared to X-ray and radio data.
- The eclipse movie got distributed to the Science Consortium and to ESA, which is planning to publish it more widely (more information on this in next week's report).

To be explored

The reason why part of the unit3 signal is missing in the BST file of June 1st. A similar thing happened last week during the flare hunting campaign: there were several gaps of 20minutes while these data got delivered to P2SC. Investigation is ongoing.

2. LYRA instrument status

Calibration

LYRA performed a special calibration campaign on June 1 2011:

- Description: Dark and LED signals were measured with 2 units simultaneously. The integration times (=cadence) was changed during the acquisition in order to see the effect on the noise. All possible integration times were used: 10s, 5s, 2s, 1s, 500ms, 200ms, 100ms, 50ms, 20ms, 10ms.
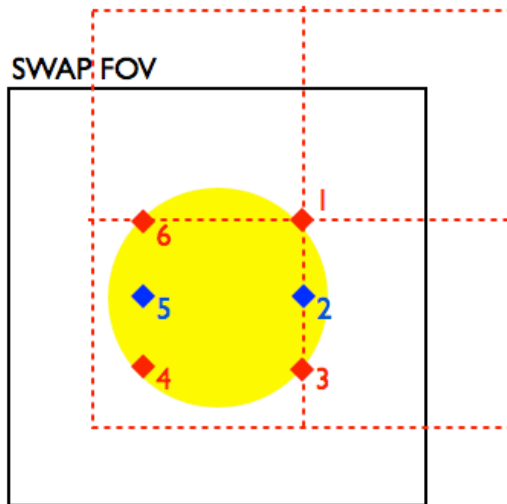- Results:
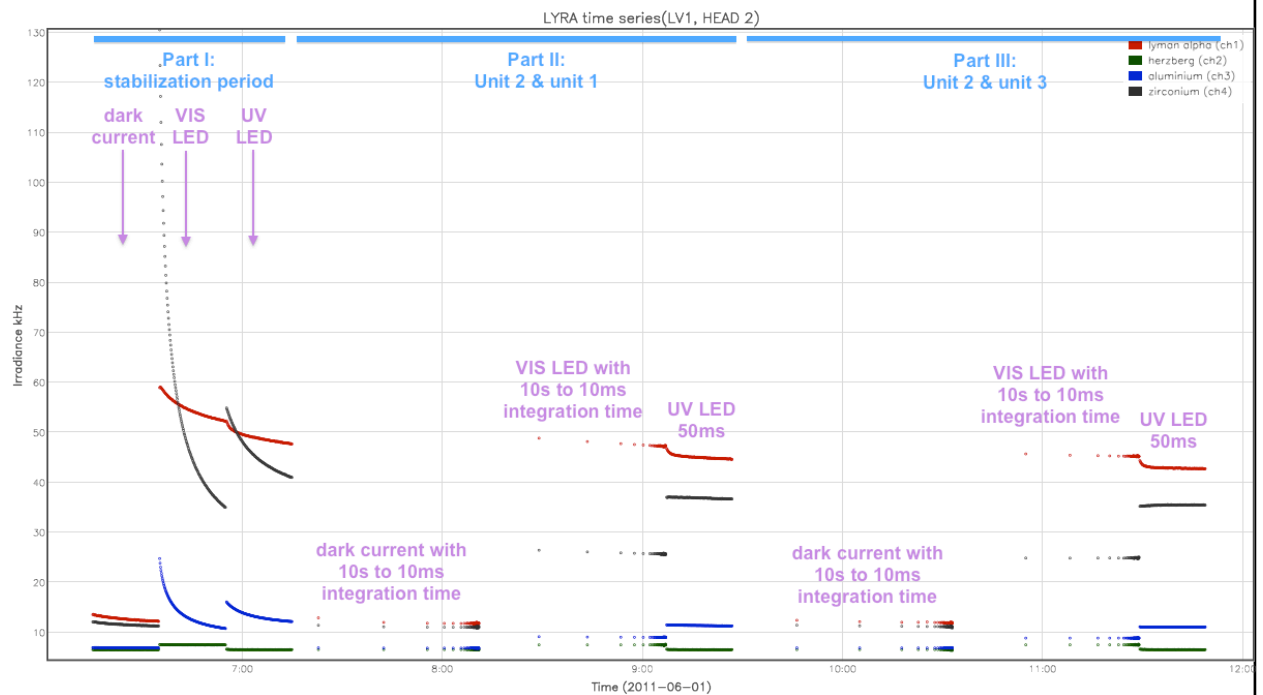
Zooming in on the dark current with unit 2. It is clear how the noise evolves:
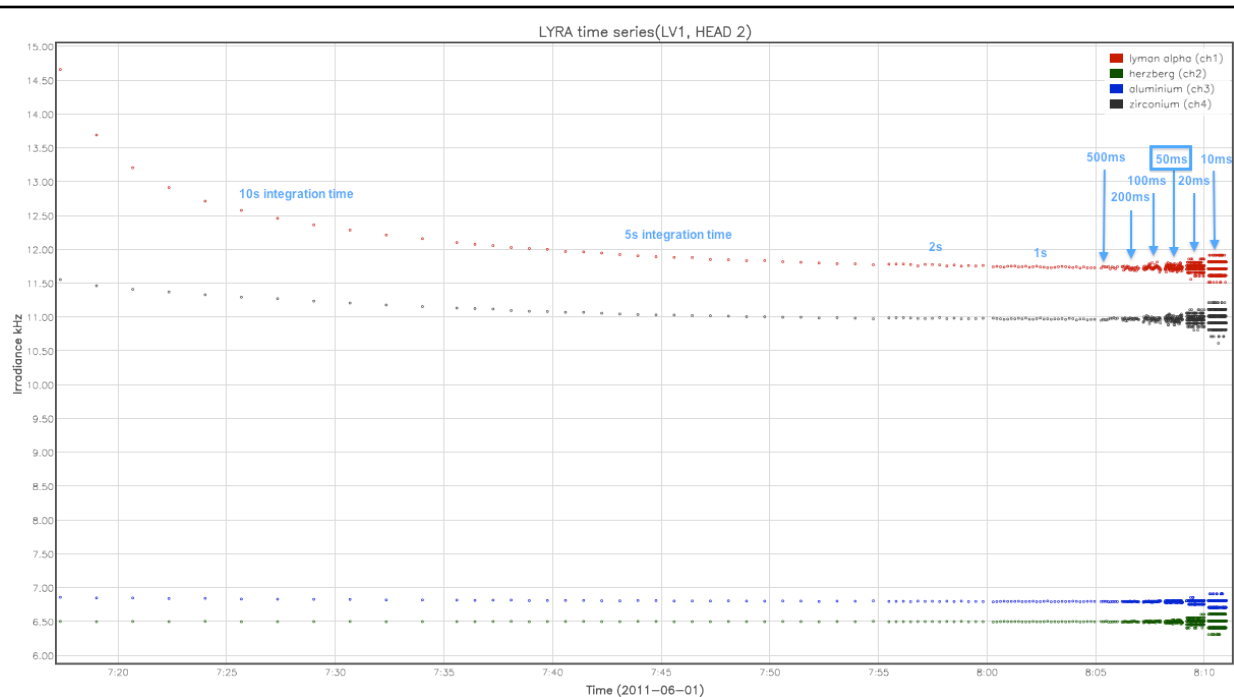
More investigation needs to reveal which is the optimal cadence of LYRA to increase the signal to noise.

A Paving campaign was performed on June 2 2011
- Description: The campaign ran during one orbit, in order to probe many often used paving coordinates during the 4 LAR positions.
  SWAP supported the campaign by off-pointing PROBA2 to 6 different, slightly offpointed positions with the Sun still in the SWAP FOV, and to one offpoint far from the Sun centre.
  - The first 6 positions are often used during SWAP mosaic and off-limb campaigns: ~8 arcmins to the 4 corners of the FOV and to the far East and far West of the FOV.
  - The 7th position is offpointing 3 degrees in both X and Y: the typical position used for SWAP LED campaigns.
  These 7 positions are repeated for all 4 LARs.
 See schema below (random numbering of the pointings):

- Resulting data:
  For unit 2, the offpointing to 3degrees off is clearly visible because the Sun moves out of the LYRA FOV. The differences due to the small offpoints are rather subtile.
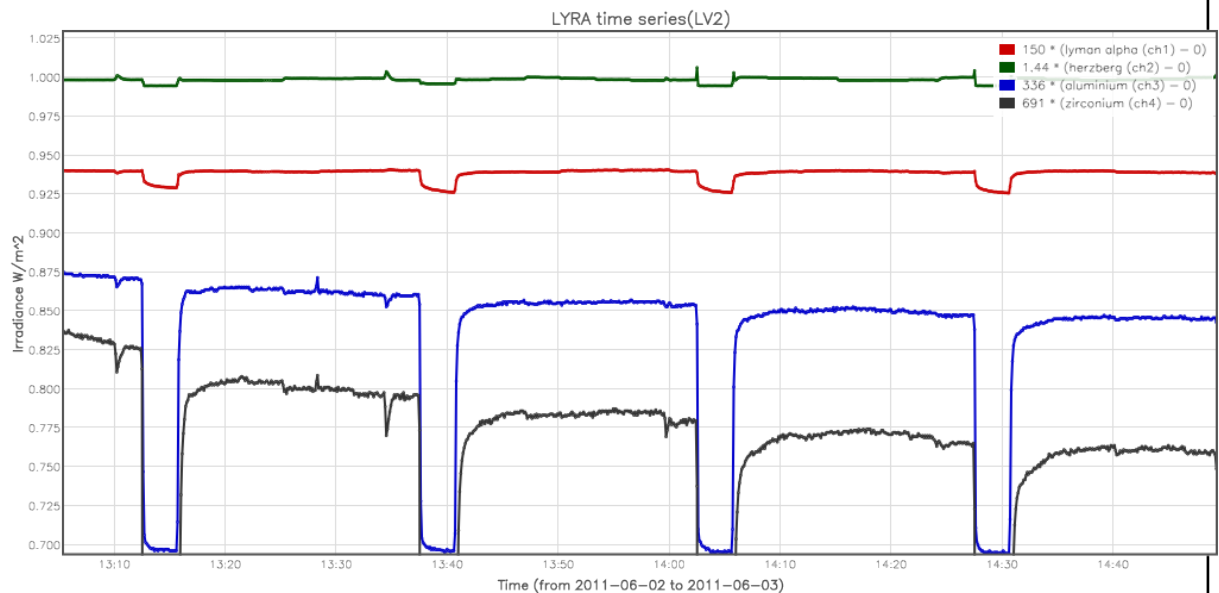
For unit 3, similar results are found, except that also small offpoints are very much influencing the signals of Herzberg and Ly-alpha:

LYRA time series(LV1)
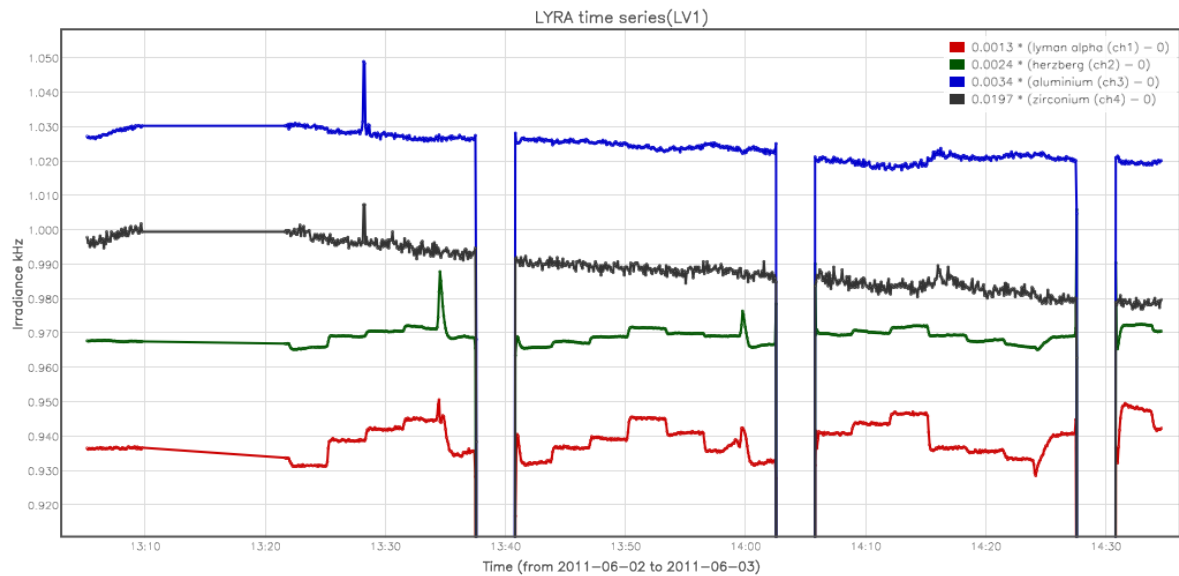
We experienced the same problem as on June 1st: part of the unit 3 data are missing from the BST FITS file: to be explored.

IOS & operations

Monday 30 May	Tuesday 31 May	Wednesday 1 Jun	Thursday 02 Jun	Friday 03 Jun	Saturday 04 Jun	Sunday 05 Jun
Nominal acquisition	Nominal acquisition + propulsion experiment	Nominal acquisition + eclipse campaign	Nominal acquisition + LYRA paving campaign	Nominal acquisition	Nominal acquisition	Nominal acquisition
(LYIOS00169)	(LYIOS00169)	(LYIOS00170)	(LYIOS00171)	(LYIOS00171)	(LYIOS00171)	(LYIOS00171)

An ASIC reload (automatically scheduled onboard every 100 orbits) took place on May 31 around 22:19.

LYRA detector temperature
The LYRA detector 2 temperature (nominal unit) fluctuated between approx. 41.5 and 48.3 degrees Celsius. Effects were seen of all the calibration and scientific campaigns involving backup acquisition, offpoints and LYRA being switched off:
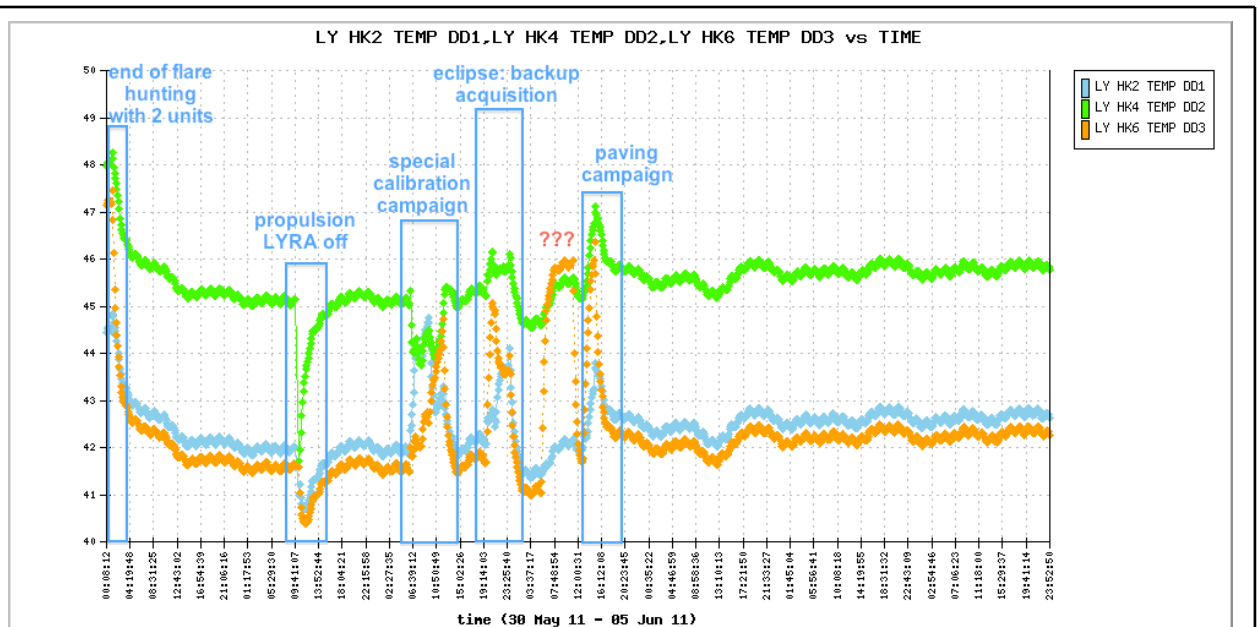
The reason for the jump in unit 3 detector temperature on June 2 around 0:00UT is not clear. Form the current of the Techno demonstrations it is seen that BST and FSX or CCM switch on around 7UT that day but the relation is not at all clear.

To be explored
- The reason why part of the unit3 signal is missing in the BST file of June 2nd paving campaign.

3. SWAP instrument status

MCPM recoverable errors
increased from 1212 to 1289 this week.
The number of MCPM unrecoverable errors is still 0.

IOS & operations

| Monday 30 May	Tuesday 31 May	Wednesday 01 Jun	Thursday 02 Jun	Friday 03 Jun	Saturday 04 Jun	Sunday 05 Jun
Nominal acquisition 110s	Nominal acquisition 110 + propulsion campaign + LED campaign	Nominal acquisition 110s + eclipse campaign	Nominal acquisition 120 + SWAP mosaic + LYRA paving campaign	Nominal acquisition 120s	Nominal acquisition 110 + propulsion campaign + LED campaign	Nominal acquisition 110 + propulsion campaign + LED campaign
(IOS00300)	(IOS00302)	(IOS00302)	(IOS00302, IOS00303)	(IOS00303)	(IOS00304)	(IOS00304)
732 images	726 images	891 images	817 images	719 images	425 images	200 images

Satellite anomaly
On Sunday June 5, the MCPM blocked at 1:44UT and no images were downloaded during more than 24 hours (passes 4797 to 4808 on Monday June 6.) During that time, many images

got overwritten onboard. The first download happened again on June 6 around 9UT.

This resulted in regular gaps of 330s on Saturday and Sunday (only 1 image out of 3 downloaded) and a large data gap from June 4 20:18 to June 5 4:44UT and a small gap from June 5 6:50 to 7:56UT. Due to the priority numbering of images onboard, the period of the datagap was limited to ~6hours.

SWAP detector temperature
The SWAP Cold Finger Temperature fluctuated between approx. -2 and 3.5 degrees Celsius. Effects were seen of the propulsion experiment in flight mode on May 31, and LYRA backup acquisitions on June 1 and 2.
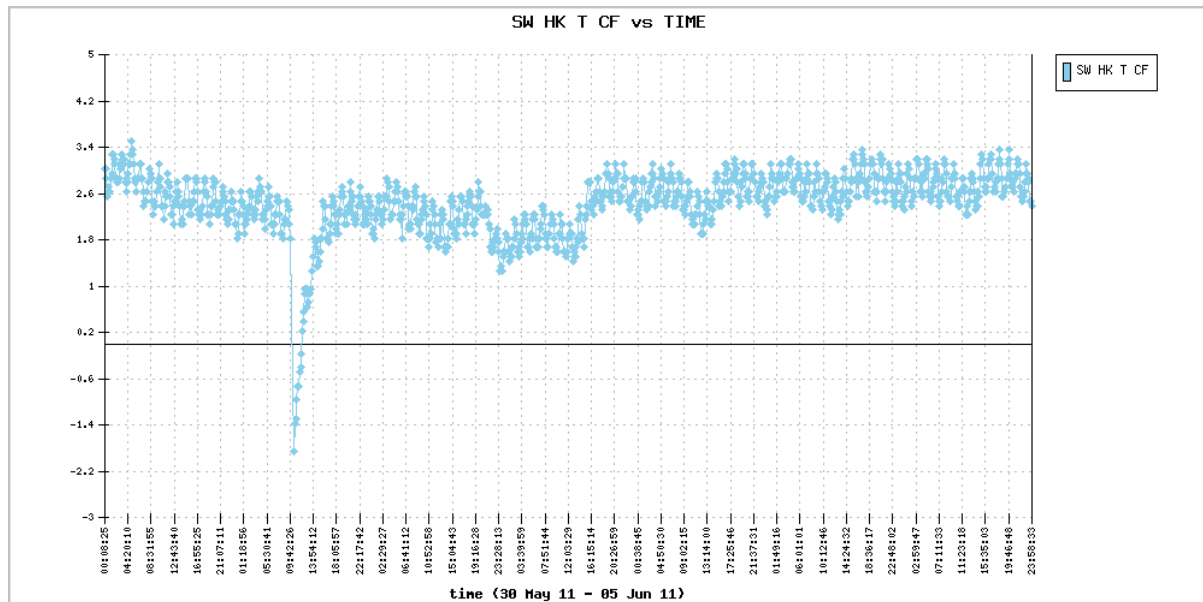
To be explored
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4. PROBA2 Science Center Status

Anik De Groof was operator during this week.

No P2SC tools were updated on the operational server this week.

5. Data reception & discussions with MOC

Passes
There were no big problems with the passes this week.
- Pass 4743 first contained corrupted SWAP images but was resend later
- LYRA data of pass 4748 could not be processed and caused a gap from May 30 17:42-20:50UT. This gap could be filled with half cadence because the cyclic buffer could be redumped on one of the next passes.
- some SWAP images missing or truncated in passes 4748, 4751, 4760, 4761, 4767, 4780,

4781

Data coverage HK
Complete

Data coverage SWAP

The overall data coverage was very good during the first part of this week. Many images got downloaded.
In the weekend, the coverage was less good because of 6 minute cadence on Saturday and Sunday + the 6 hours gap due to the MCPM blockage.

Statistics for complete week:
> *Total number of images between 2011 May 30 0UT and 2011 Jun 06 0UT: 4510*
> *Highest cadence in this period: 10 seconds*
> *Average cadence in this period: 134.11 seconds*
> *Number of image gaps larger than 300 seconds: 266*
> *Number of image gaps larger than 400 seconds: 3 (propulsion experiment + 6hour & 1hour datagap due to MCPM blockage)*
> *Largest data gap: 506.00 minutes (6hour datagap due to MCPM blockage)*

Data coverage LYRA
Complete except half cadence from May 30 17:42-20:50UT.

6. APPENDIX Frequently used acronyms

ADP	Ancillary Data Processor
ADPMS	Advanced Data and Power Management System
AOCS	Attitude and Orbit Control System
APS	Active Pixel image Sensor
ASIC	Application Specific Integrated Circuit
BBE	Base Band Equipment
CME	Coronal Mass Ejection
COGEX	Cool Gas Generator Experiment
CRC	Cyclic Redundancy Check
DR	Destructive Readout
DSLP	Dual Segmented Langmuir Probe
EIT	Extreme ultraviolet Imaging Telescope
FITS	Flexible Image Transport System
FOV	Field Of View FPA Focal Plane Assembly
FPGA	Field Programmable Gate Arrays
GPS	Global Positioning System
HAS	High Accuracy Star tracker
HK	Housekeeping
ICD	Interface Control Document
IIU	Instrument Interface Unit
IOS	Instrument Operations Sheet
LED	Light Emitting Diode
LEO	Low Earth Orbit
LYRA	LYman alpha RAdiometer

LYTMR	LYRA Telemetry Reformatter (software module of P2SC)
LYEDG	LYRA Engineering Data Generator (software module of P2SC)
MCPM	Mass Memory, Compression and Packetisation Module
MOC	Mission Operation Center
NDR	Non Destructive Readout
OBET	On board Elapsed Time
OBSW	On board Software
PE	Proximity Electronics
PGA	Programmable Gain Amplifier
PI	Principal Investigator
P2SC	PROBA2 Science Center
PPT	Pointing, Positioning and Time (software module of P2SC)
ROB	Royal Observatory of Belgium
SAA	South Atlantic Anomaly
SCOS	Spacecraft Operation System
SEU	Single Event Upset
SOHO	Solar and Heliospheric Observatory
SWAP	Sun Watcher using APS detector and image Processing
SWAVINT	SWAP AVerage INTensity
SWBSDG	SWAP Base Science Data Generator
SWEDG	SWAP Engineering Data Generator (software module of P2SC)
SWTMR	SWAP Telemetry Reformatter (software module of P2SC)
TBC	To Be Confirmed
TBD	To Be Defined
TBW	To Be Written
TC	Telecommand
TPMU	Thermal Plasma Measurement Unit
UTC	Coordinated Universal Time
UV	Ultraviolet